

Introduction to Infrastructural Engineering

Construction Materials5

by

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Concrete recycling

- increasingly common method of disposing of concrete structures
- recycling is increasing due to
 - improved environmental awareness
 - governmental laws
 - economic benefits
- Recycling concrete provides
 - environmental benefits
 - conserving landfill space

Construction materials

- Asphalt
- Aggregate
- Brick
- Gypsum



Asphalt

- Also known as bitumen
- Dark brown to black
- Highly viscous
- Hydrocarbon produced from petroleum distillation residue.
- At least 80% carbon, which explains its deep black color.
- Sulphur is another ingredient.
- Primarily used as a sealant for rooftops and a durable surface for roads, airport runways, playgrounds and parking lots.



<http://www.ekocozum.com/blog/wp-content/uploads/2008/05/asfalt.jpg>



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Asphalt

- Asphalt can be separated from the other components in crude oil
- By the process of fractional distillation, usually under vacuum conditions.

http://www.cranedigital.com/case_studies/oil_and_gas/fractional_distillation_column2.jpg



Fractional Distillation Column
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Types of asphalt

- The major types of asphalt used in construction are ;
- Rolled asphalt
- Mastic asphalt.



<http://www.pkeenanroads.com/wp-content/gallery/stone/rolled.jpg>



Rolled Asphalt

- Made of aggregate, or solid materials such as sand, gravel, or recycled concrete, with an asphalt binder.
- Used to make roads and other surfaces, such as parking lots, by being applied in layers and compacted.
- Different types of rolled asphalt are distinguished according to the process used to bind the aggregate with the asphalt.

Types of rolled asphalt

- **Hot mix asphalt concrete (HMAC)**
 - Produced at 160 degrees Celsius.
 - This high temperature serves to decrease viscosity and moisture during the manufacturing process, resulting in a very durable material.
 - HMAC is most commonly used for high-traffic areas, such as busy highways and airports.



<http://www.crossroadspaving.com/images/asphalt-paving-repair.jpg>



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Rolled asphalt

- **Warm mix asphalt concrete (WAM or WMA)**

- Reduces the temperature required for manufacture by adding asphalt emulsions, waxes, or zeolites.

- Benefits both the environment and the workers, as it results in less fossil fuel consumption and reduced emission of fumes.



http://www.wispave.org/images/iStock_000007064664XSmall.jpg



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ROLLED ASPHALT

- **Cold mix asphalt concrete,**

- Emulsified in soapy water before mixing it with the aggregate, eliminating the need for high temperatures altogether.

- The asphalt produced is not nearly as durable as HMA or WAM

- Typically used for low traffic areas or to patch damaged HMA.



<http://www.dykespaving.com/wp-content/themes/classic/images/coldmix.jpg>



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